

1 **CLAIMS**

2 **1.** A method of controlling memory usage in a computer system having  
3 limited physical memory, wherein one or more application programs execute in  
4 conjunction with an operating system, comprising the following steps:

5     setting a plurality of memory thresholds;  
6     at increasingly critical memory thresholds, <sup>taking</sup> wielding increasing operating  
7 system control over said one or more application programs to minimize memory  
8 usage.

9  
10     **2.** A system as recited in claim 1, wherein the step of wielding  
11 increasing operating system control comprises the following steps:

12     at a less critical memory threshold, interacting with at least one of the  
13 application programs to limit its use of memory;

14     at a more critical memory threshold, terminating at least one of the  
15 application programs without allowing its further execution.

16  
17     **3.** A system as recited in claim 1, wherein the step of wielding  
18 increasing operating system control comprises the following step:

19     prompting a user to designate at least one of the applications programs and  
20 then requesting it to close itself.

21  
22     **4.** A system as recited in claim 1, wherein the step of wielding  
23 increasing operating system control comprises the following step:

24     prompting a user to designate at least one of the applications programs and  
25 then terminating it without allowing its further execution.

1  
2 5. A system as recited in claim 1, wherein the step of wielding  
3 increasing operating system control comprises the following steps:

4 at a first memory threshold, requesting at least one of the application  
5 programs to limit its use of memory;

6 at a second memory threshold, requesting at least one of the application  
7 programs to close itself;

8 at a third memory threshold, terminating at least one of the application  
9 programs without allowing its further execution.

10  
11 6. A system as recited in claim 1, wherein the step of wielding  
12 increasing operating system control comprises the following steps:

13 at a first memory threshold, requesting at least one of the application  
14 programs to limit its use of memory;

15 at a second memory threshold, prompting a user to designate at least one of  
16 the application programs and then requesting it to close itself;

17 at a third memory threshold, prompting the user to designate at least one of  
18 the application programs and then terminating it without allowing its further  
19 execution.

20  
21 7. A system as recited in claim 1, further comprising the following  
22 additional step:

23 at one or more of the memory thresholds, reclaiming unused stack memory.  
24  
25

1           8. A system as recited in claim 1, further comprising the following  
2 additional step:

3           at one or more of the memory thresholds, discarding read-only memory.  
4

5           9. A computer-readable storage medium having computer-executable  
6 instructions for performing the steps recited in claim 1.  
7

8           10. A computer-readable storage medium having instructions for  
9 controlling memory usage in a computer system having limited physical memory,  
10 wherein one or more application programs execute in conjunction with an  
11 operating system, the instructions being executable by the computer system to  
12 perform steps comprising:

13           at a first memory usage threshold, requesting at least one of the application  
14 programs to close itself;

15           at a second memory usage threshold that is more critical than the first  
16 memory usage threshold, terminating at least one of the application programs  
17 without allowing its further execution.  
18

19           11. A computer-readable storage medium as recited in claim 10, the  
20 instructions being executable to perform additional steps comprising:

21           before performing the requesting step, prompting a user to select one of the  
22 application programs to be closed;

23           before performing the terminating step, prompting the user to select one of  
24 the application programs to be terminated.  
25

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1       **12.**   A computer-readable storage medium as recited in claim 10, the  
2 instructions being executable to perform additional steps comprising:

3           before performing the requesting step, requiring a user to select one of the  
4 application programs to be closed;

5           before performing the terminating step, requiring the user to select one of  
6 the application programs to be terminated.

7  
8       **13.**   A computer-readable storage medium as recited in claim 10, the  
9 instructions being executable to perform an additional step comprising:

10          at a further memory threshold that is less critical than the first and second  
11 memory usage thresholds, requesting at least one of the application programs to  
12 limit its use of memory.

13  
14       **14.**   A computer-readable storage medium as recited in claim 10, the  
15 instructions being executable to perform an additional step comprising:

16          reclaiming unused stack memory before requesting at least one of the  
17 application programs to close itself and before terminating at least one of the  
18 application programs.

19  
20       **15.**   A computer-readable storage medium as recited in claim 10, the  
21 instructions being executable to perform an additional step comprising:

22          discarding read-only memory before requesting at least one of the  
23 application programs to close itself and before terminating at least one of the  
24 application programs.

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1           16. A computer-readable storage medium as recited in claim 10, the  
2 instructions being executable to perform additional steps comprising:

3           reclaiming unused stack memory and discarding read-only memory before  
4 requesting at least one of the application programs to close itself and before  
5 terminating at least one of the application programs.

6  
7           17. A method of controlling memory usage in a computer system having  
8 limited physical memory, wherein one or more application programs execute in  
9 conjunction with an operating system, comprising the following steps:

10           at a first memory usage threshold, requesting at least one of the application  
11 programs to limit its use of memory

12           at a second memory usage threshold that is more critical than the first  
13 memory usage threshold, requesting at least one of the application programs to  
14 close itself;

15           at a third memory usage threshold that is more critical than the first and  
16 second memory usage thresholds, terminating at least one of the application  
17 programs without allowing its further execution;

18           reclaiming unused stack memory and discarding read-only memory before  
19 requesting at least one of the application programs to close itself and before  
20 terminating at least one of the application programs.

21  
22           18. A method as recited in claim 17, wherein the reclaiming and  
23 discarding steps are performed at further memory usage thresholds that are set in  
24 relation to the second and third memory usage thresholds.  
25



1 a virtual memory system that includes physical memory but does not  
2 include secondary storage;

3 one or more application programs that utilize the virtual memory system;

4 wherein the operating system is configured to perform the following steps:

5 monitoring physical memory usage;

6 at increasingly critical physical memory usage thresholds, wielding  
7 increasing control over said one or more application programs to minimize  
8 physical memory usage.

9  
10 **24.** A computer system as recited in claim 23, wherein the step of  
11 wielding increasing control comprises the following steps:

12 at a less critical memory threshold, interacting with at least one of the  
13 application programs to limit its use of memory;

14 at a more critical memory threshold, terminating at least one of the  
15 application programs without allowing its further execution.

16  
17 **25.** A computer system as recited in claim 23, wherein the step of  
18 wielding increasing control comprises the following step:

19 prompting a user to designate at least one of the applications programs and  
20 then requesting it to close itself.

21  
22 **26.** A computer system as recited in claim 23, wherein the step of  
23 wielding increasing control comprises the following step:

24 prompting a user to designate at least one of the applications programs and  
25 then terminating it without allowing its further execution.

1  
2       27. A computer system as recited in claim 23, wherein the step of  
3 wielding increasing control comprises the following steps:

4           at a first memory threshold, requesting at least one of the application  
5 programs to limit its use of memory;

6           at a second memory threshold, requesting at least one of the application  
7 programs to close itself;

8           at a third memory threshold, terminating at least one of the application  
9 programs without allowing its further execution.

10  
11       28. A computer system as recited in claim 23, wherein the step of  
12 wielding increasing control comprises the following steps:

13           at a first memory threshold, requesting at least one of the application  
14 programs to limit its use of memory;

15           at a second memory threshold, prompting a user to designate at least one of  
16 the application programs and then requesting it to close itself;

17           at a third memory threshold, prompting the user to designate at least one of  
18 the application programs and then terminating it without allowing its further  
19 execution.

20  
21       29. A computer system as recited in claim 23, wherein the operating  
22 system is further configured to perform the following additional step:

23           at one or more of the memory thresholds, reclaiming unused stack memory.  
24  
25



1       30. A computer system as recited in claim 23, wherein the operating  
2 system is further configured to perform the following additional step:

3       at one or more of the memory thresholds, discarding read-only memory.

4  
5       31. A computer system as recited in claim 23, wherein the step of  
6 wielding increasing control comprises the following steps:

7       at a first memory threshold, requesting at least one of the application  
8 programs to limit its use of memory;

9       at a second memory threshold, prompting a user to designate at least one of  
10 the application programs and then requesting it to close itself;

11       at a third memory threshold, prompting the user to designate at least one of  
12 the application programs and then terminating it without allowing its further  
13 execution;

14       before prompting the user, reclaiming unused stack memory and discarding  
15 read-only memory.

16  
17       32. A method of controlling memory usage in a computer system having  
18 limited physical memory, wherein one or more application programs execute in  
19 conjunction with an operating system, comprising the following steps:

20       monitoring memory usage;

21       when memory usage is high, sending a message from the operating system  
22 to at least one of the application programs requesting the application program to  
23 minimize its current use of memory.  
24  
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1           33. A method as recited in claim 32, further comprising a step of  
2 sending the message to the application program when memory usage reaches a  
3 defined threshold.

4  
5           34. A method as recited in claim 32, wherein the application programs  
6 have respective message loops, the method further comprising a step of sending  
7 the message to the application program through its message loop.

8  
9           35. A method as recited in claim 32, wherein the application programs  
10 have respective message loops, the method further comprising a step of sending  
11 the message to a particular application program that was least recently active.

12  
13           36. A computer-readable storage medium having computer-executable  
14 instructions for performing the steps recited in claim 32.

15  
16           37. A computer-readable storage medium having instructions for  
17 controlling memory usage in a computer system having limited physical memory,  
18 wherein one or more application programs execute in conjunction with an  
19 operating system, the instructions being executable by the computer system to  
20 perform steps comprising:

21           monitoring memory usage;  
22           at a defined memory usage threshold, sending a message from the operating  
23 system to at least one of the application programs requesting the application  
24 program to minimize its current use of memory.  
25

